
कैप्ताफोल तकनीकी — विशिष्टि

(पहला पुनरीक्षण)

Captafol Technical — Specification

(First Revision)

ICS 65.100.30

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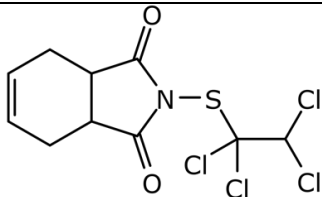
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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pesticides Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Captafol, technical is used in fungicidal formulations.

Captafol is the common name accepted by the International Organization for Standardization (ISO) for N - (1, 1, 2, 2- tetrachloroethyl) thio – 4 – cyclohexene – 1,2 – dicarboxymide. The empirical and structural formulae and molecular mass are as given below:

<i>Empirical Formula</i>	<i>Structural Formula</i>	<i>Molecular Mass</i>
$C_{10}H_9Cl_4NO_2S$		349.0

This standard was first published in 1982. In this revision, the standard has been brought out in the latest style and format of the Indian Standards.

In the preparation of this standard due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CAPTAFOL TECHNICAL — SPECIFICATION

(*First Revision*)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for captafol, technical.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

<i>IS No.</i>	<i>Title</i>
IS 1070 : 1992	Reagent grade water — Specification (<i>third revision</i>)
IS 6940 : 1982	Methods of test for pesticides and their formulations (<i>first revision</i>)

*IS No.**Title*

IS 8069 : 1989	High density polyethylene (HDPE) woven sacks for packing pesticides — Specification (<i>second revision</i>)
IS 8117 : 1976	Specification for DW tarpaulin laminated jute bags for pesticides
IS 8190 (Part 1) : 1988	Requirements for packing of pesticides: Part 1 Solid pesticides (<i>second revision</i>)
IS 10946 : 1996	Methods of sampling for technical grade pesticides

3 REQUIREMENTS

3.1 Description — The material shall be in the form of light to yellow powder free from extraneous matter.

3.2 The material shall also comply with the requirements given in Table 1.

Table 1 Requirements for Captafol, Technical
(*Clause 3.2*)

SI No.	Characteristics	Requirement	Method of Test, Ref. To
(1)	(2)	(3)	(4)
i)	Captafol contents, percent by mass, <i>Min</i>	95.0	Annex A
ii)	Moisture content, percent by mass, <i>Max</i>	2.0	IS 6940
iii)	Acidity (as H ₂ SO ₄), percent by mass, <i>Max</i>	2.0	IS 6940

4 PACKING**4.1 Packing**

The material shall be packed in mild steel or tinplate or fibreboard containers or double hessian jute bags or DW tarpaulin laminated jute bags (*see* IS 8117) or HDPE woven sacks (*see* IS 8069). The containers shall also comply with the general requirements as specified in 2 of IS 8190 (Part 1).

5 MARKING**5.1 Marking**

The containers shall bear legibly and indelibly the

following information in addition to any other information:

- a) Name of the material;
- b) Name and address of the manufacturer;
- c) Batch number;
- d) Date of manufacture;
- e) Date of expiry;
- f) Net quantity;
- g) Nominal captafol content, percent (*m/m*);
- h) Cautionary notice as worded in the *Insecticides Act*, 1968, and Rules framed thereunder; and
- j) Any other information required under the Legal Metrology (Packaged Commodities) Rules, 2011.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn according to IS 10946.

7 TESTS

7.1 Tests shall be carried out by the methods referred to in col 4 of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A
[Table 1, Sl No. (i)]

DETERMINATION OF CAPTAFOL CONTENT

A-1 PRINCIPLE

Captafol is separated from chlorine containing impurities by silicic acid column chromatography. Captafol fraction from the column is quantitatively decomposed to chloride ion by sodium biphenyl reagent. The liberated chloride is then titrated via Volhard's procedure.

A-2 REAGENTS

A-2.1 Silicic Acid — chromatographic grade.

A-2.2 Benzene — analytical reagent grade.

A-2.3 Sand — washed.

A-2.4 Ether-Benzene Mixture — 1:1 (v/v) (anhydrous reagent grade ether).

A-2.5 Benzene-Hexane Mixture — 7 : 3 (v/v).

A-2.6 Acetone — analytical reagent grade.

A-2.7 Nitric Acid — 6 percent (v/v).

A-2.8 Sodium Biphenyl Reagent —

30 percent (m/m).

A-2.9 Phenolphthalein Indicator Solution —

1 percent (m/v) in absolute alcohol.

A-2.10 Dilute Nitric Acid — 1 : 1 (v/v).

A-2.11 Standard Silver Nitrate Solution — 0.1 N.

A-2.12 Hydrazine Sulphate — Crystals.

A-2.13 Hydrogen Peroxide — 30 percent (v/v).

A-2.14 Standard Potassium Thiocyanate Solution — 0.1N.

A-2.15 Ferric Alum Indicator — Saturated, aqueous, freshly prepared,

A-2.16 Toluene — Chloride free,

A-2.17 Sodium Hydroxide Solution —

30 percent (m/m).

A-2.18 Nitrobenzene

A-3 APPARATUS

A-3.1 Chromatographic Column

25 cm long and 25 mm internal diameter with teflon stopcock outlet and the bottom of the column fitted

with a fritted glass disc that supports the absorbent and 100 ml reservoir at the top.

A-4 PROCEDURE

A-4.1 Preparation of Column

The silicic acid should be hydrated to the extent of 10 percent. This can be accomplished by first drying at 150 °C for several hours and finally shaking for several hours with 10 percent by mass of distilled water (*see Note*). Shake 20 g of the hydrated silicic acid with 50 ml of benzene. Stir the mixture with a glass rod until all the lumps have been broken up and no entrapped air bubbles remain. Drain the liquid, rinsing down the walls of the column with more benzene. Do not allow the liquid to drop below the top of the silicic acid column. Put 1 cm to 2 cm layer of the washed sand on top of the column to prevent disturbance of the silicic acid when the solvents are added.

NOTE — If the silicic acid is too dry, breakdown of captafol may occur on the column. If too wet, absorption of captafol on the column may not be completed.

A-4.2 Accurately weigh about 0.25 g of captafol, technical and dissolve in about 25 ml of benzene. Pour the solution on to the column, rinsing with a small quantity of benzene. Using air pressure, force the liquid into the column. Again do not allow the liquid level to drop below the top of the column. Rinse the column with four 25 ml portions of benzene-hexane mixture (*see A-2.5*). Rinse off the tip of the column with a small amount of acetone. Discard the benzene-hexane washes and the acetone rinse.

A-4.3 Mute captafol from the column with four 25 ml portions of ether benzene mixture (*see A-2.4*) into a 400 ml beaker. Push the last amount of eluent completely through the column, allowing the column to go dry. Rinse off the tip of the column, which may have crystals of captafol on the outside, with a small amount of acetone, collecting this rinse with the ether benzene eluate.

A-4.4 Add a boiling chip to the eluate and gently boil off most of the solvent leaving approximately 5 ml - 10 ml. Transfer quantitatively into a 125 ml separating funnel using 25 ml - 30 ml of toluene. Cautiously add 10 ml - 14 ml of sodium biphenyl reagent, mix by swirling and let stand for 5 minutes. If solution is not dark green, add

additional 10 ml - 14 ml reagent and keep for 15 minutes.

A-4.5 Destroy excess reagent by dropwise addition of water, shaking frequently between additions until green colour is completely removed. Then slowly add 25 ml dilute nitric acid (6 percent v/v) with intermittent swirling. Stopper the separator and mix with gentle rocking motion, venting occasionally. Avoid vigorous shaking during the first extraction. Let separate, rinse the stopper and walls of separating funnel with water, and drain the aqueous phase into a 250 ml erlenmeyer flask. Re-extract the mixture with two 25 ml portions of dilute nitric acid (6 percent v/v) by shaking vigorously. Add aqueous extracts into the erlenmeyer flask.

A-4.6 Add 30 percent sodium hydroxide to the acid solution in the erlenmeyer flask carefully until alkaline to the phenolphthalein, and add 1 ml excess. Add 5 ml of 30 percent hydrogen peroxide solution, heat to boiling on hot plate, and boil for approximately 10 minutes. Let it cool slightly, cautiously add 5 ml more of 30 percent hydrogen peroxide (H₂O₂) and boil again for about 10 minutes. Cool and add a small flake (about 0.05 g) of hydrazine sulphate to remove the last traces of hydrogen peroxide.

A-4.7 Neutralize the solution with nitric acid (see **A-2.10**) using phenolphthalein. Add 10 ml in excess. A known excess of 0.1 N silver nitrate solution is added accurately and back titrated with standard potassium thiocyanate solution using ferric alum as indicator and nitrobenzene to coagulate the silver chloride formed. Run a blank with the product to make a correction for the inorganic chloride.

A-4.8 Calculation

Captafol content, percent by mass

$$= \frac{8.73 \times (B - A) \times N}{M}$$

where

B = volume, in ml, of potassium thiocyanate solution required for the blank determination;

A = volume, in ml, of potassium thiocyanate solution required for sample;

M = mass, in g, of sample taken for the test (see **A-4.2**); and

N = normality of potassium thiocyanate solution.

ANNEX B
(Foreword)

COMMITTEE COMPOSITION

Pesticides Sectional Committee, FAD 01

<i>Organization</i>	<i>Representative(s)</i>
Directorate of Plant Protection Quarantine and Storage, Faridabad	DR RAVI PRAKASH (Chairperson)
All India Biotech Association, New Delhi	SHRI SAURABH SINGHAL SHRI SHAH JI DHAR (<i>Alternate</i>)
Central Insecticide Board and Registration Committee, Faridabad	SECRETARY DR VANDANA SETH (<i>Alternate</i>)
Central Insecticide Laboratory, Faridabad	DR ARCHANA SINHA SHRI SUBHASH CHAUDHARY (<i>Alternate</i>)
Consumer Guidance Society of India, Mumbai	SHRI SITARAM DIXIT DR M. S. KAMATH (<i>Alternate</i>)
Crop Care Federation of India, New Delhi	DR J. C. MAJUMDAR
Crop Life India, New Delhi	SHRI ASITAVA SEN MS NIRUPAMA SHARMA (<i>Alternate</i>)
CSIR-Indian Institute of Toxicology Research, Lucknow	DIRECTOR DR SHEELENDRA P. SINGH
Food Safety and Standards Authority of India, New Delhi	ADVISOR (STANDARDS)
FMC India Pvt Ltd, Bengaluru	SHRI CHIRAG PATEL
IDMA Laboratories Ltd, Chandigarh	DR INDRA RAI
Indian Agricultural Research Institute, New Delhi	DIRECTOR
Indian Institute of Packaging, Mumbai	DR TANWEER ALAM
Indian Pest Control Association, New Delhi	SHRI UDAYAN GHOSH
Institute of Pesticide Formulation Technology, Gurgaon	DR M. VAIRAMANI
Ministry of Agriculture, Department of Agriculture, Chennai	JOINT DIRECTOR OF AGRICULTURE (RES) DEPUTY DIRECTOR LAB (<i>Alternate</i>)
National Centre for Integrated Pest Management, New Delhi	DR SUMITRA ARORA
National Institute of Plant Health Management, Hyderabad	DR MAHESH SAINI Ms T. SRIDEVI (<i>Alternate</i>)
Pesticide Manufactures and Formulators Association of India (PMFAI), Mumbai	DR ARCHANA SRIVASTAVA DR UDAY KUMAR (<i>Alternate</i>)
Regional Pesticides Testing Laboratory, Chandigarh	SHRI V. VASU

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BIS Directorate General	SHRIMATI SUNEETI TOTEJA, SCIENTIST 'E'/DIRECTOR AND HEAD (FOOD AND AGRICULTURE DEPARTMENT) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary
SHRI KULDEEP MITTAL
SCIENTIST 'B'/ ASSISTANT DIRECTOR
(FOOD AND AGRICULTURE DEPARTMENT), BIS

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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